Stock Market Prediction Using Machine Learning and Artificial Intelligence

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Abstract : The successful prediction of a stock's future price could yield significant profit. The efficient-market hypothesis suggests that stock prices reflect all currently available information and any price changes that are not based on newly revealed information thus are inherently unpredictable. Recent work on this issue shows initial evidence that machine learning techniques are capable of identifying dependency in the stock market price sequences, However, due to the high volatility and non-stationary nature of the stock market, forecasting the trend of a financial time series remains a big challenge. But in this project we try to reflect Market Sentimental the information that collect from Market Traders, News Agencies and Stocks Brokers along with Technical and Fundamentals of company we process information with high performance Machine Learning and Data Analytics and get the result in four major category that is Quality(Long term financial),Valuation(Attractiveness),Financial Trend(Current financial trend), Technical(Short/Long trend)

IndexTerms **– Stock, Prediction, Analytics, Prediction, Finance, Short Term, Long Term, Fundamental.**

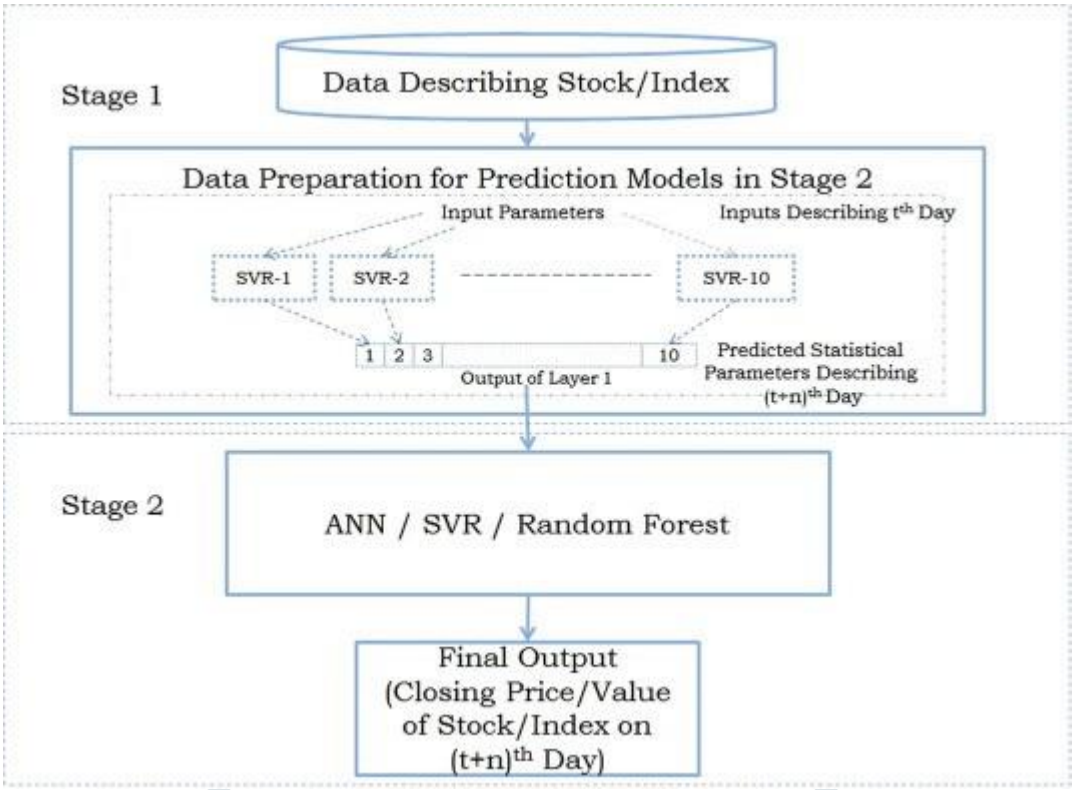
I. INTRODUCTION

Predicting how the stock market will perform is one of the most difficult things to do. There are so many factors involved in the prediction – physical factors vs. physiological, rational and irrational behavior, etc. All these aspects combine to make share prices volatile and very difficult to predict with a high degree of accuracy.

Predicting the Stock Market has been the bane and goal of investors since its existence. Everyday billions of dollars are traded on the exchange, and behind each dollar is an investor hoping to profit in one way or another. Entire companies rise and fall daily based on the behavior of the market. Should an investor be able to accurately predict market movements, it offers a initializing promises of wealth and influence. It is no wonder then that the Stock Market and its associated challenges find their way into the public imagination every time it misbehaves. The 2008 financial crisis was no different, as evidenced by the flood of films and documentaries based on the crash. If there was a common theme among those productions, it was that few people knew how the market worked or reacted. Perhaps a better understanding of stock market prediction might help in the case of similar events in the future.

Financial markets are highly volatile and generate huge amounts of data daily It is the most popular financial market instrument and its value changes quickly Stock prices are predicted to determine the future value of companies' stock or other financial instruments that are marketed on financial exchanges However, the stock market is influenced by many factors such as political events, economic conditions and traders' expectation.

II. WORKFLOW



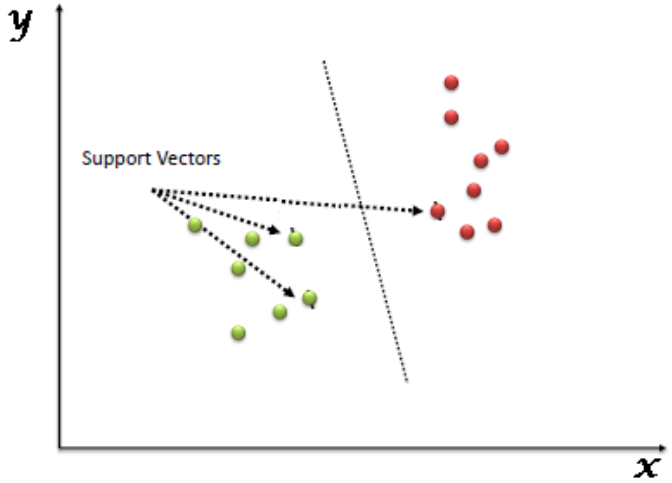
III. MACHINE LEARNING IN PREDICTION

Support Vector Machines (SVM) and Artificial Neural Networks (ANN) are widely used for prediction of stock prices and its movements. Every algorithm has its way of learning patterns and then predicting. Artificial Neural Network (ANN) is a popular method which also incorporate technical analysis for making predictions in financial markets. The field of Machine Learning is vast and plays a key role in a wide range of critical applications.

The concept of Support Vector Machines (SVM) have advanced features that are reflected in their good generalization capacity and fast computation. Predicting the stock market involves predicting the closing prices of a company's stock for any given number of days ahead. SVMs can be used to perform Linear Regression on previous stock data to predict the closing prices using Time series forecasting and other optimization algorithms.

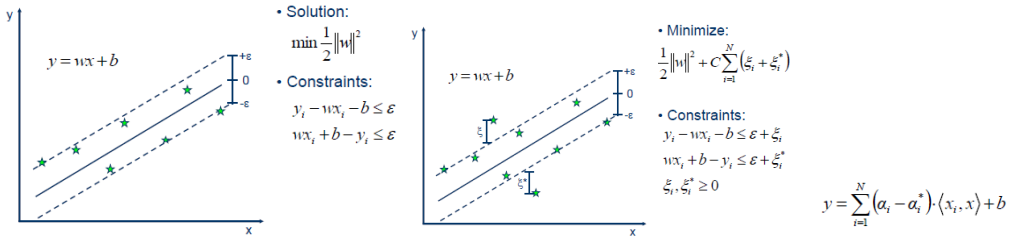
1.VECTOR MACHINE LEARNING

"Support Vector Machine" (SVM) is a supervised machine learning algorithm which can be used for both classification or regression challenges. However, it is mostly used in classification problems. In this algorithm, we plot each data item as a point in n-dimensional space (where n is number of features you have) with the value of each feature being the value of a particular coordinate. Then, we perform classification by finding the hyper-plane that differentiate the two classes very well (look at the below snapshot)



1.1.SUPPORT VECTOR MACHINE – REGRESSION (SVR)

Support Vector Machine can also be used as a regression method, maintaining all the main features that characterize the algorithm (maximal margin). The Support Vector Regression (SVR) uses the same principles as the SVM for classification, with only a few minor differences. First of all, because output is a real number it becomes very difficult to predict the information at hand, which has infinite possibilities. In the case of regression, a margin of tolerance (epsilon) is set in approximation to the SVM which would have already requested from the problem. But besides this fact, there is also a more complicated reason, the algorithm is more complicated therefore to be taken in consideration. However, the main idea is always the same: to minimize error, individualizing the hyperplane which maximizes the margin, keeping in mind that part of the error is tolerated.



This is the Demo Model Code of Vector Machine for Stock Prediction which support Linear Regression

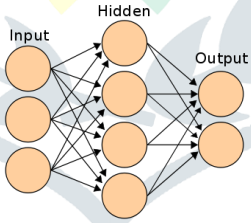
https://github.com/shreeshailaya/Python-/blob/master/stocks_pre.ipynb

2.ARTIFICIAL NEURAL NETWORK (ANN)

Finance is highly nonlinear and sometimes stock price data can even seem a completely random. Traditional time series methods such as ARIMA and GARCH models are effective only when the series is stationary, which is a restricting assumption that requires the series to be preprocessed by taking log returns (or other transforms). However, the main issue arises in implementing these models in a live trading system, as there is no guarantee of stationarity as new data is added. This is combated by using neural networks, which do not require any stationarity to be used. Furthermore, neural networks by nature are effective in finding the relationships between data and using it to predict (or classify) new data.

2.1.FORMATION OF ARTIFICIAL NEURAL NETWORK (ANN)

We will start with understanding formulation of a simple hidden layer neural network. A simple neural network can be represented as shown in the figure below:



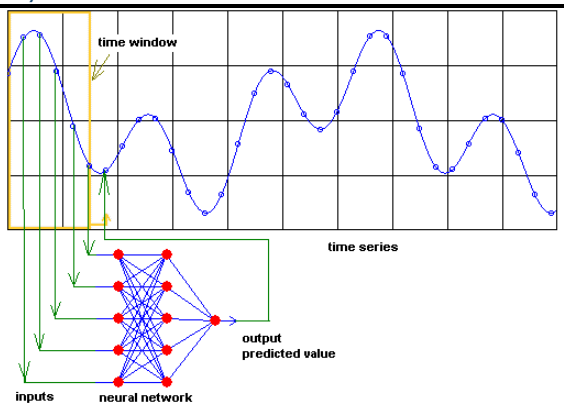
The linkages between nodes are the most crucial finding in an ANN. We will get back to "how to find the weight of each linkage" after discussing the broad framework. The only known values in the above diagram are the inputs. Let's call the inputs as I1, I2 and I3, Hidden states as H1, H2.H3 and H4, Outputs as O1 and O2.

2.2.PREDICTING VALUE OR TREND

When we want to get exact value (or more values) of a variable in future, then we are predicting value. Other possibility is to predict trend of a variable, i.e., whether the value will go up or down without considering size of the change - then we are predicting trend. When predicting trend, we are in fact classifying into two (or three) classes - up and down (or no significant change). Prediction of a close value is generally easier than predicting a trend. Besides trend we may also want to predict other parts of the trend, such as moving average change etc.

2.3.NEURAL NETWORK TRAINING

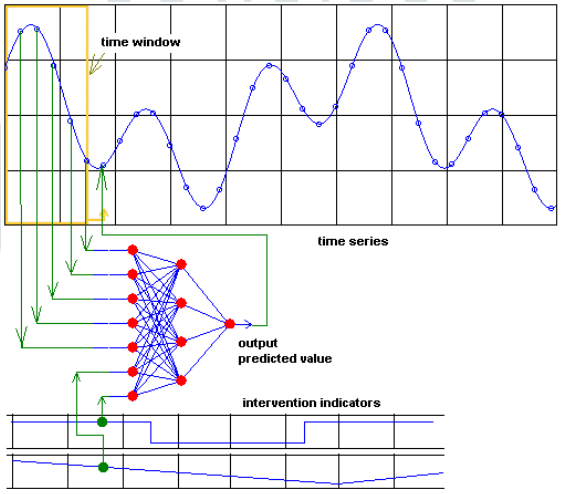
The prediction of time series using neural network consists of teaching the net the history of the variable in a selected limited time and applying the taught information to the future. Data from past are provided to the inputs of neural network and we expect data from future from the outputs of the network



teaching of the time series without interventional variables. The points in graph represent time series obtained by a sampling of continuous data.

As we can see, the teaching with teacher is involved. For more exact prediction, additional information can be added for teaching and prediction, for example in the form of interventional variables (intervention indicators) - see the figure. However, more information does not always mean better prediction; sometimes it can make the process of teaching and predicting worse. It is always necessary to select really relevant information, if it is available.

Various types of neural networks can be used for prediction, such as backpropagation, ART, Marks network and others. In the rest of this text we will focus on backpropagation.



Teaching of the time series with intervention indicator

IV. CONCLUSION

In this paper Here we conclude that there are two ways of prediction of stock one is Artificial Neural Network System and the Vector Machine Algorithm so in this project we are going to use both methods for sorting and predicting the stock price.

SVM is a promising type of tool for financial forecasting. SVM is superior to the other individual classification methods in forecasting daily movement direction. This is a clear message for financial forecasters and traders, which can lead to a capital gain.

Neural networks are suitable for predicting time series mainly because of learning only from examples, without any need to add additional information that can bring more confusion than prediction effect. Neural networks are able to generalize and are resistant to noise. On the other hand, it is generally not possible to determine exactly what a neural network learned and it is also hard to estimate possible prediction error.

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